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Striving to Protect Sailors from Parasitic Diseases

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By Lt. Kimberly Edgel, deputy director, Parasitology Department, Naval Medical Research Unit 6, Peru

*Editor's note: This is the final blog in a six part series from NAMRU-6.



Lt. Kimberly Edgel, left, and Christian Baldeviano examine a positive malaria blood smear at U.S. ... studying the interplay between malaria and the human immune system to identify new mal

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Parasitic diseases have had devastating effects on military operations for millennia and this may have even changed the course of history. It has been speculated that both Alexander the Great and Genghis Khan died from malaria, a disease caused by *Plasmodium* parasites which are transmitted by the bite of infected female anopheline mosquitoes.

In U.S. military history, malaria has been particularly destructive, resulting in over one million cases during the American Civil War, thousands of cases in World War I and hundreds of thousands of cases in World War II. General Douglas MacArthur was quoted as saying, “This will be a long war if, for every division I have facing the enemy, I must count on a second division in the hospital with malaria and a third division convalescing from this debilitating disease!” Currently, fewer sailors and soldiers are diagnosed with this potentially life-threatening disease, due to extensive desert combat in recent years, but it remains a grave threat to future combat operations elsewhere.

The country of Peru, where [NAMRU-6](#) is located, has played a key role in mankind’s fight against malaria. The Quechua people who are indigenous to Peru determined long ago that the bark of the cinchona tree could be used to treat malaria. This knowledge led to the development of one of the first antimalarial drugs: quinine.



Luis Angel Rosales, the NAMRU-6 biologist who enrolls malaria patients in the remote gold mining area of Madre de Dios. (Courtesy photo by NAMRU-6)

While modern day antimalarial drug discovery continues to be an important objective, assessment of antimalarials already in use must be performed to ensure that drug resistant malaria strains do not spread. To that end, the [Parasitology Department](#) will be performing a study to assess the efficacy of artesunate in collaboration with other overseas laboratories of the Department of Defense: the Navy detachment in Ghana (NAMRU-3), the [Army laboratories in Thailand \(AFRIMS\)](#) and [Kenya \(USAMRU-K\)](#).

This antimalarial is the first-line treatment in many countries for malaria caused by *Plasmodium falciparum*. The joint study will provide invaluable information on how quickly the parasite is eliminated from the bloodstream which could be used to determine if artesunate-resistant malaria strains have emerged.

In addition, the Parasitology Department studies other important tactics to increase operational readiness: [malaria vaccine development and disease surveillance](#). For example, the department has worked closely with the Jenner Institute on a pre-clinical trial to assess the efficacy of a new blood stage antigen known as *Plasmodium falciparum* reticulocyte-binding protein homologue 5 (PfRH5). Using an *Aotus nancymae* non-human primate model of malaria infection, one formulation of the PfRH5 vaccine was shown to confer protection against a challenge dose of parasites. In light of such promising results, the Jenner Institute is planning a Phase I clinical trial in human volunteers. If future clinical trials prove successful, the PfRH5 vaccine could significantly improve force health protection for U.S. service members since it may potentially reduce the severity of malaria symptoms and thereby decrease the number of malaria-related sick days.

Furthermore, the Parasitology Department is an integral part of major, world class research efforts such as the [National Institutes of Health Amazonia International Center of Excellence](#)

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[for Malaria Research \(ICEMR\)](#). As part of the ICEMR, the department is assessing the epidemiology of malaria caused by *Plasmodium vivax* in the Department of Madre de Dios located in the southern Peruvian Amazon. In this remote region, illegal gold miners have presented with very high rates of malaria in the last decade.

Our hope is to better understand the risk factors associated with malaria, to characterize the circulating malaria strains genetically, to estimate the risk of drug resistance, and to work closely with the Peruvian Ministry of Health to improve malaria control.

The Parasitology Department, along with military colleagues, academic collaborators, and Peruvian partners, is working actively to decrease the burden of illness caused by malaria on service members and civilians alike. By preventing the spread of antimalarial drug resistance, developing vaccines against *Plasmodium*, and identifying the risk factors associated with malaria transmission, we hope to help protect sailors and shift the balance in our favor so that, one day, this leading parasitic killer will be eradicated from the face of the earth.

Click on the following links to see the series of blogs from NAMRU-6: [1 \(NAMRU-6 overview\)](#), [2 \(bacteriology\)](#), [3 \(entomology\)](#), [4 \(virology\)](#) and [5 \(emerging infections\)](#).



The NAMRU-6 Parasitology Department. (Courtesy photo by NAMRU-6)

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